the tip stem intersects the tip head about midway angularly between orifices 42, 43 and also intersects orifice 41 or extends very closely adjacent thereto. Further, the axis C—C passes through or is very closely adjacent to the point 45.

The torch tip is made of a rigid metal that retains it shape during normal use. Advantageously the tip stem is made of stainless steel and the tip head is made of copper, the stainless steel stem providing the desired strength and isolating the head from the torch head and handle during operation. Further, the minimum linear spacing between the tip ends 38, 39 is larger than the outer diameter of the tubular member 47 or joint of two tubular sections that are to be joined, for example by soldering, or otherwise heated while performing a maintenance operation.

In using the torch, it may be moved relative to the tubular member 47 that is to be soldered or otherwise heated such that the tip head ends 38, 39 pass on diametrically opposite sides of the tubular member to a position that the central axis of the tubular member (pipe) extends through or is closely adjacent to the common point 45 of the tip head such as shown in FIGS. 1 and 2. At this time, the tip provides three flames to substantially completely surround the tubing 47. In being used to solder two tubular sections together, the joint is heated evenly and minimizes cold spots, which in turn aids in providing complete and evenly soldered joints. The tip produces flames that converge directly on the tubular member and thereby makes efficient use of heat energy produced while there is minimal residual flame that could burn surrounding structure or components. Further, since the flames substantially surround the tubular member, the side of the tubular member opposite the operator can be easily heated even though the back side of the tubing is located in a corner or in other areas where it is difficult to access with single or two flame tips.

Even though the tip head has been described as having three orifices, it is to be understood it may be provided with more orifices that are substantially equally angularly spaced from one another along the head's arcuate length and of substantially the same linear spacing from a common point 45. Further, a conventional flexible tip extension may be connected between the tip and the tip adaptor.

As an example of the invention, but not otherwise as a limitation thereon, with a tip usable for soldering pipes of ¼ to ⅞ outer diameter, the minimum linear spacing of the tip head ends (gap) would be about $1\frac{1}{16}$ inches and the flame at each orifice would produce a flame at an angle away from the cutting plane of the circular section of the tip, at an angle of about 20 to 35 degrees. This keeps the flame from overheating the tip while it is soldering the pipe. The tip orifices are about 0.020 to 0.030 inches in diameter. For larger diameter tubes, there would be provided a tip head having its orifices at a greater minimum spacing from point 45 and advantageously would have more than three orifices, would be a greater arcuate length and a greater linear spacing between terminal ends 38, 39 than that used for soldering pipes of ⅞ inch outer diameters.

What is claimed is:

1. A torch comprising a torch head having an oxygen passageway and a fuel gas passageway formed therein, each passageway having an inlet, a torch handle connected to the torch head and having a fluid conduit for each passageway in fluid communication with the respective inlet, oxygen control means mountable on the torch head to extend into the oxygen passageway for selectively blocking the flow therethrough and adjustably controlling the rate of flow therethrough, fuel gas control means mountable on the torch head to extend into the fuel gas passageway for selectively blocking the flow therethrough and adjustably controlling the rate of flow therethrough, a torch tip, and means for attaching the torch tip to the torch head and cooperating with

the torch head to place the torch tip in fluid communication with said fuel gas and oxygen passageways, said torch tip including a tip stem having an inlet end in fluid communication with said fuel gas and oxygen passageways and an outlet end and a tip head joined to the tip outlet end in fluid communication with the tip outlet end and extending angularly through an angle of at least about 240°, said tip head having at least a first, a second and a third outlet orifice, the orifices being angularly spaced from one another and opening toward a common point.

2. The torch of claim 1 wherein the orifices are spaced by an angle of at least 100°.

3. The torch of claim 1 wherein the outlet orifices are substantially equally angularly spaced from one another.

4. The torch of claim 1 wherein the tip head is of an elongated length, has opposite first and second closed ends and is arcuately curved along its length between its closed ends, the first orifice is located adjacent the tip head first end and the second orifice is located adjacent the tip head second end.

5. The torch of claim 4 wherein the third orifice is about midway angularly between the first and second orifices and is angularly spaced from each of the first and second orifices by an angle of about 120°.

6. The torch of claim 5 wherein each of the orifices is of substantially equal linear spacing from said point and the tip head extends arcuately through an angle of less than about 280°.

7. The torch of claim 6 wherein the tip head has an angularly inner peripheral surface having the orifices opening therethrough and an angularly outer peripheral surface more remote from said point than the angularly inner peripheral surface, the tip stem is joined to an angularly outer peripheral surface and has a central axis of elongation that extends through said point.

8. The torch of claim 7 wherein the tip stem is joined to the tip head angularly about midway between the first and the third orifices.

9. A torch tip adapted for use with a fuel gas torch to heat or solder a metal structure such as tubular members, comprising an elongated tip stem having an inlet end and an outlet end and an elongated tubular head arcuately curved about a common point and spaced therefrom, said tip head being of an arcuate length to extend angularly through an angle of at least about 245° relative to said point and having first and second closed ends and a fluid passageway extending between the closed ends, said tip head having an angularly inner peripheral surface and an angularly outer peripheral surface more remotely spaced from said point along its length than the angularly inner peripheral surface, said inner peripheral surface having several outlet orifice opening therethrough toward said common point and to the tip head passageway and being substantially equally angularly spaced from one another, the tip stem having a passageway extending from the stem inlet end and opening to the tip head passageway.

10. The torch tip of claim 9 wherein the orifices include a first orifice adjacent to the first head end, a second orifice adjacent to the second head end and a third orifice angularly about midway between the first and second orifices.

11. The torch tip of claim 10 wherein the tip stem has a central axis of elongation that extends through said point and extends angularly away from said point about midway between the first and third orifices.

12. The torch tip of claim 10 wherein the third orifice angularly is spaced about 120 degrees from each of the first and second orifices and the torch head extends angularly through an angle less than about 280°.

* * * * *

13. A torch, comprising:

a torch head having a fuel gas passageway provided therein;

a torch handle connected to said torch head and having a fuel gas conduit provided therein and connected to said fuel gas passageway of said torch head for providing fuel gas to said fuel gas passageway;

fuel gas control means mounted upon said torch head and operatively associated with said fuel gas passageway provided within said torch head for selectively controlling the rate of flow of said fuel gas through said fuel gas passageway provided within said torch head;

a torch tip; and

means for mounting said torch tip upon said torch head such that said torch tip is disposed in fluidic communication with said fuel gas passageway of said torch head;

said torch tip comprising a tip head having a substantially arcuate configuration, extending through an angular extent of at least substantially 240º, and having at least three flame outlet orifices which are substantially equiangularly spaced with respect to each other throughout said at least substantially 240º angular extent of said torch head and which open toward a common point.

14. The torch as set forth in Claim 13, wherein:

said substantially arcuate tip head has a substantially arcuate inner peripheral surface and a substantially arcuate outer peripheral surface more remote from said common point than said substantially arcuate inner peripheral surface; and

said at least three flame outlet orifices are substantially defined upon said substantially arcuate inner peripheral surface of said tip head.

15. The torch as set forth in Claim 13, further comprising:

an oxygen passageway defined within said torch head;

an oxygen conduit provided within said torch handle and fluidically connected to said oxygen passageway defined within said torch head for providing oxygen to said oxygen passageway; and

oxygen control means mounted upon said torch head and operatively associated with said oxygen passageway provided within said torch head for selectively controlling the rate of flow of said oxygen through said oxygen passageway provided within said torch head.

16. A torch, comprising:

a torch head having a fuel gas passageway provided therein;

a torch handle connected to said torch head and having a fuel gas conduit provided therein and connected to said fuel gas passageway of said torch head for providing fuel gas to said fuel gas passageway;

fuel gas control means mounted upon said torch head and operatively associated with said fuel gas passageway provided within said torch head for selectively controlling the rate of flow of said fuel gas through said fuel gas passageway provided within said torch head;

a torch tip; and

means for mounting said torch tip upon said torch head such that said torch tip is disposed in fluidic communication with said fuel gas passageway of said torch head;

said torch tip comprising a tip head having a substantially arcuate configuration and having at least three flame outlet orifices which are substantially equiangularly spaced with respect to each other throughout said arcuate extent of said tip head and which open toward a common point, said substantially arcuate tip head being disposed within a plane so as to in effect define a substantially planar member, and said at least three flame outlet orifices are defined within said substantially arcuate tip head such that said at least three flame outlet orifices project flames outwardly therefrom at a predetermined angle with respect to the plane within which said substantially planar tip head member is disposed.

17. The torch as set forth in Claim 16, wherein:

said predetermined angle at which said flames are projected outwardly from said at least three flame outlet orifices, with respect to said plane within which said substantially planar tip head is disposed, is within the range of 20-35º.

Sub A7

18. The torch as set forth in Claim 16, further comprising:

an oxygen passageway defined within said torch head;

an oxygen conduit provided within said torch handle and fluidically connected to said oxygen passageway defined within said torch head for providing oxygen to said oxygen passageway; and

oxygen control means mounted upon said torch head and operatively associated with said oxygen passageway provided within said torch head for selectively controlling the rate of flow of said oxygen through said oxygen passageway provided within said torch head.

Sub B16

19. The torch as set forth in Claim 16, wherein:

said substantially arcuate tip head has an angular extent of at least substantially 240º.

20. A torch tip for use with a fuel gas torch for heating tubular members, comprising:

a tip stem having a first end for connection to a torch head of a fuel gas torch; and

a tip head connected to a second end of said tip stem,

said tip head comprising a substantially arcuate tubular member, extending through an angular extent of at least substantially 240º about an axis and radially spaced therefrom, and having at least three flame outlet orifices which are substantially equiangularly spaced with respect to each other throughout said at least 240º angular extent of said arcuate tip head and which open toward a common point disposed upon said axis.

21. The torch tip as set forth in Claim 20, wherein:

said substantially arcuate tip head has a substantially arcuate inner peripheral surface and a substantially arcuate outer peripheral surface more remote from said common point than said substantially arcuate inner peripheral surface; and

said at least three flame outlet orifices are substantially defined upon said substantially arcuate inner peripheral surface of said tip head.

22. The torch tip as set forth in Claim 20, wherein:

said at least three flame outlet orifices of said tip head comprise a first orifice disposed adjacent to a first end of said tip head, a second orifice disposed adjacent to a second end of said tip head, and a third orifice interposed substantially midway between said first and second orifices.

23. A torch tip for use with a fuel gas torch for heating tubular members, comprising:

a tip stem having a first end for connection to a torch head of a fuel gas torch; and

a tip head connected to a second end of said tip stem,

said tip head comprising a substantially arcuate tubular member, extending about an axis and radially spaced therefrom, and having at least three flame outlet orifices which are substantially equiangularly spaced with respect to each other throughout said arcuate extent of said tip head and which open toward a common point disposed upon said axis, said substantially arcuate tip head being disposed within a plane so as to in effect define a substantially [planar member, and said at least three flame outlet orifices are defined within said substantially arcuate tip head such that said at least three flame outlet orifices project flames outwardly therefrom toward said common point and at a predetermined angle with respect to said plane within which said substantially planar tip head member is disposed.

24. The torch tip as set forth in Claim 23, wherein:

said predetermined angle at which said flames are projected outwardly from said at least three flame outlet orifices, toward said common point, and with respect to said plane within which said substantially planar tip head is disposed, is within the range of 20-35°.

25. The torch as set forth in Claim 23, wherein:

said substantially arcuate tip head has an angular extent of at least substantially 240°.

26. The torch tip as set forth in Claim 23, wherein:

said at least three flame outlet orifices of said tip head comprise a first orifice disposed adjacent to a first end of said tip head, a second orifice disposed adjacent to a second end of said tip head, and a third orifice interposed substantially midway between said first and second orifices.